

**EVALUATION OF A SMOKING CESSATION PROGRAM IN THE U.S. NAVY:  
IMPLICATIONS FOR LONG TERM SUCCESS AND FAILURE**

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## Summary

### Problem

The prevalence of smoking among military personnel exceeds rates established for the general population by approximately 20%. Studies from 1980 through 1986 have estimated that approximately half of all military personnel are smokers. An examination of the Navy's smoking cessation programs is necessary for the Navy to meet stated health objectives to reduce the prevalence of smoking among personnel, ensure a healthy work environment (SECNAVINST 5100.13A), and provide a substantial savings to the U.S. Navy in terms of potential person-hours lost due to smoking-related illnesses.

### Objective

The purpose of the study was to examine the conditions under which participants quit smoking in a Navy-sponsored smoking cessation program and abstained in follow-up.

### Approach

The sample (N=616) consisted of smokers enrolled in a Navy smoking cessation program between 1985 and 1987.

### Results

Results indicated that program attendance and use of nicotine gum resulted in higher quit rates in the seven session program, but high rate of attendance was a more important factor for long-term abstinence. College educated smokers electing to use nicotine gum and attending four or more smoking classes were better abstainers than less educated smokers. (K7) ←

### Conclusions

Smokers who fail to complete a full regimen of smoking cessation classes and who decline the use of nicotine gum will, in all probability, fail to stop smoking in the Navy's program. Implementing a system of incentives to motivate smokers to stop smoking, enter smoking cessation programs, and comply with treatment would reduce the prevalence of heavy smokers in the Navy and create healthier work environments.

## INTRODUCTION

The prevalence of smoking among military personnel exceeds rates established for the general population by approximately 20% (Office of the Assistant Secretary of Defense, 1986; Herbold, 1987). Studies have documented military smoking rates at 52% in 1980 (Burt Associates, Inc., 1980), 53% in 1982 (Bray, Guess, Mason et al., 1983), and approximately 50% in 1986 (Bray, Marsden, Guess et al., 1986; Conway & Cronan, 1986). In accounting for these high rates of smoking among Navy personnel, recent research concluded that smokers were not more likely to enter the Navy than non-smokers (Cronan and Conway, 1987). Personnel begin to smoke after entering the Navy. Approximately 28% of incoming recruits were smokers. This compares dramatically with the 50% rate of smoking found among shipboard personnel. The factors most likely responsible for smoking in the Navy implicate certain institutional and environmental factors of Navy life. Peer group pressure, modeling of smoking behavior by younger recruits, stress or boredom on the job, smoking cigarettes during work breaks, and the availability of inexpensive cigarettes in the Navy are cited as the most likely factors conducive to smoking in the Navy (Cronan and Conway, 1987). Development and evaluation of smoking cessation programs was cited as one method to reduce the rate of smoking in the Navy.

Ensuring a healthy work environment and reducing the prevalence of smoking among personnel are major health objectives in the U.S. Navy. To accomplish these goals, the Navy is providing smokers with encouragement and professional assistance to stop smoking (SECNAVINST 5100.13A [17 July 86]). This requires a further examination of the effectiveness of the Navy's smoking cessation programs. Current literature now supports the design of smoking cessation programs that combine behavioral change techniques with pharmacological strategies such as nicotine gum (Daughton, Kass, Fix et al., 1986; Hall, Tunstall, Rugg et al., 1985; Tonnesen, Pryd, Hansen et al., 1988; Alexander, 1987). In a clinical trial, smokers using nicotine gum had better quit and abstinence rates than smokers using placebo gum (Tonnesen et al., 1988). Other studies of nicotine gum have shown greater quit rates in the initial intervention but equivocal results for long-term abstinence (Puska, Bjorkqvist, & Koskela, 1979). Combining use of nicotine gum with behavior

change instruction optimizes long term cessation opportunities after initial treatment (Alexander, 1987; Tonnesen et al., 1988; Hall et al., 1985).

Evaluation of a Navy smoking cessation program was designed to examine the conditions under which participants quit smoking and abstained in follow-up. The objectives of this research were to describe the demographic, social, and behavioral characteristics of smokers enrolled in a Navy-sponsored smoking cessation program and evaluate the differences in smoking cessation outcomes. If Navy or civilian differences are determined from the analysis, generalizations can be made for comparative work with other smoker populations and other worksite settings. Specific hypotheses were: 1) there will be significant differences in smoking cessation outcomes by military or civilian status; 2) the use of nicotine chewing gum will result in more successful smoking cessation; and 3) pre-existing health conditions aggravated or caused by smoking will operate as motivational forces promoting smoking cessation.

#### METHODS

##### Data

Data were evaluated on 616 smokers enrolled in a Navy-sponsored smoking cessation program spanning a 3 year period from 1985 through 1987.<sup>2</sup> Information was available on smokers for 1 year following the intervention. Data consisted of a 1 page patient history form, tracking information while smokers were enrolled in the smoking clinic, and follow-up information on smoker status. Smoker status in follow-up (abstained/still smoking) was determined by telephone solicitation at 3 months, 6 months, and 1 year following treatment.<sup>3</sup>

##### Intervention

Each smoking cessation clinic lasted approximately 3 1/2 weeks, meeting twice a week for a total of 7 sessions. A typical class consisted of health education and guided group discussion focused upon alternative behaviors to smoking.<sup>4</sup> Smokers were given the option of using 2 mg. nicotine chewing gum. Recommended use of the gum was in the morning, evening, and when the desire to smoke was strong. The target quit day was the fourth day of the program.

Participants completed a one page questionnaire on smoking habits and health histories prior to the intervention. Information was maintained on

each smoker regarding the number of classes attended, the use of nicotine chewing gum, the class session when gum was started, the class session when smoking was stopped, quit status by the end of the 7 session program, and abstinence in follow-up.

#### Measures

Demographic variables of age, sex, occupation, Navy paygrade, number of family members, and number of smokers at home were included in the study. Marital status and ethnicity were not included on the biographical form. Participants were occupationally characterized by civilian or military status as well as an occupational variable that assigned status to level of employment for both civilian and military employment. The occupational status scale consisted of the following five categories: 1) unemployed and retired persons, 2) skilled/semiskilled employees, 3) clerical/sales/technical workers, 4) administrative personnel, and 5) professionals/semiprofessionals.<sup>5</sup>

Medical diagnoses and health conditions were self-reported by the participants by answering yes or no to a series of questionnaire items. Diagnosed medical conditions included: coronary heart disease, lung cancer, and chronic obstructive pulmonary disease (COPD).<sup>6</sup> Smokers were also asked to list any other medical conditions and/or symptoms which they experienced (i.e., hypertension, diabetes, sinus problems, shortness of breath, etc.). These health conditions and medical diagnoses were dummy coded for the analyses (i.e. 0=no, 1=yes).

Data on smoking habits were collected prior to the first clinic visit. Participants indicated the number of cigarettes smoked per day, number of years smoked, number of times quit in the past, and number of smoking cessation programs previously attempted. In addition, the program participants indicated the brand of cigarette smoked and whether the brand was light or regular, menthol or nonmenthol. Nicotine, tar, and carbon monoxide content per cigarette was assigned on the basis of the brand indicated. Pack years, a measure of cumulative lifetime cigarette consumption, was calculated by multiplying number of packs smoked daily by number of years smoked (1 pack year = 7300 cigarettes smoked).

Quit status, sex, Navy/civilian status, medical/health conditions, and the intervention variables were dichotomous (0 or 1, yes/no, male/female, etc.). Cigarette brand and brand type were nominal variables. Occupational status

classification was an ordinal variable, as was Navy paygrade. All other variables were interval level.

#### Description of the Smoker Population

Table 1 presents a demographic profile of Navy and civilian smokers enrolled in the smoking cessation program. Nearly two-thirds of the participants (64%) were in the military and most were male (69%). Their mean age was 37.9 (sd = 11.8). The mean level of schooling was 13.1 years (sd = 3.6). Typically, participants had occupational status that was mid-level, commensurate with clerical, sales and technical jobs (see Footnote 5). In addition, the next highest occupational status level was well represented by administrative personnel.

Participants in the military were demographically distinct from the civilians. The percentage of male participants among the military was twice that among the civilians (85% versus 42%). Civilian smokers were generally older than Navy smokers. Educational attainment did not vary significantly by military status. With the exception that the percentage of unemployed or retired was greater among the civilians, the distribution of occupational levels of the military and civilian participants were similar (after translating the military rates into equivalent civilian occupations).

Smoking habits by occupation and sex are presented in Figure 1. The mean number of cigarettes smoked daily was higher among smokers in the Navy than among civilians (33 versus 31, respectively,  $p=.01$ ) and higher among males than among females (34 versus 28, respectively,  $p<.001$ ). Patterns of smoking behavior also varied by military/civilian status. In line with the age difference, the civilian participants had been smokers longer than the military participants. The length of time spent smoking was 28 years for civilians as compared to 17 years for those in the military, a significant difference ( $p<.001$ ). Smokers in the military started smoking, on the average, at about age 16 as compared to age 18 for the civilians ( $p<.001$ ). Although the civilians smoked less per day than the military participants, the civilians, because they were older, had significantly higher pack years than Navy smokers (31 versus 44, respectively,  $P<.001$ ). Despite the age difference between the two groups, the mean number of times the participants had previously quit smoking was substantially the same. The number of times quit as a function of length of time smoked was significantly higher for those in

the military ( $p < .001$ ). Civilians had enrolled in more formal smoking cessation programs than smokers in the Navy ( $p < .01$ ). There were no significant differences between number of smokers in the participants' families by military status.

Females differed from males in terms of some important characteristics. The mean age at which females started smoking was 17 as compared to 16 for males (significant at  $p = .01$ ). However, the mean number of years that the participants smoked (21.3 years) did not vary significantly by gender. Although there was no important difference in the number of years spent smoking, males had consumed significantly more cigarettes on a daily basis (34 versus 28 for females,  $p < .001$ ) and consequently over their lifetimes (26 pack years versus 25 for females,  $p < .05$ ). Not only did the males smoke more per day than the females, the males smoked cigarettes which were higher in tar, nicotine, and carbon monoxide. The proportion of participants who selected light cigarettes was higher among females than males (see Appendix, Table A-1).

The data revealed some notable differences between males and females by military status. Although daily average cigarette consumption was greater among the military participants, females in the military (26 cigarettes/day) tended to smoke less than female civilians (29 cigarettes/day). Although females in the military represented the youngest of the military status/gender cross-classified groups, they had tried more often than any other group to quit smoking. Although all of the groups showed a preference for regular cigarettes over light, Navy females smoked a higher proportion of light cigarettes than any other group. Preference for non-menthol (versus menthol) cigarettes was clear for all the groups and most pronounced for Navy males.

## RESULTS

### Quit and Abstinence Rates

By the final class session, 49.8% of all smokers had quit smoking. In follow-up, 25.8% had successfully abstained at 3 months, 15.8% had abstained at 6 months, and 12.6% were not smoking at 1 year (see Appendix, Table A-2). Approximately half of all military smokers or 46% quit smoking by the end of the 7 session program and only 10% successfully abstained 1 year later. Fifty

Table 1. Smoker's Profile by Occupation and Sex

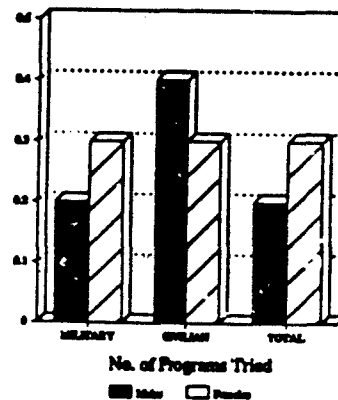
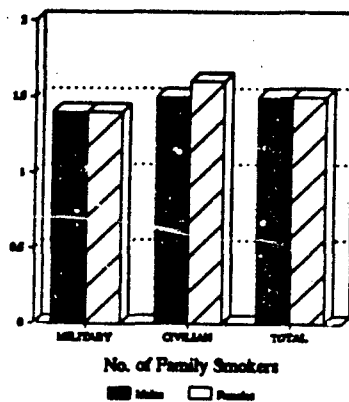
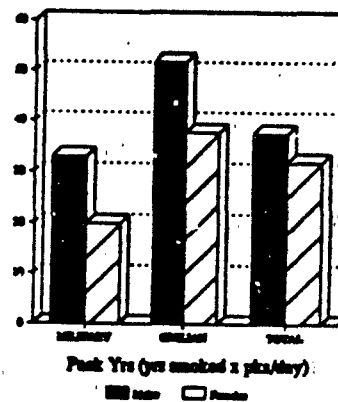
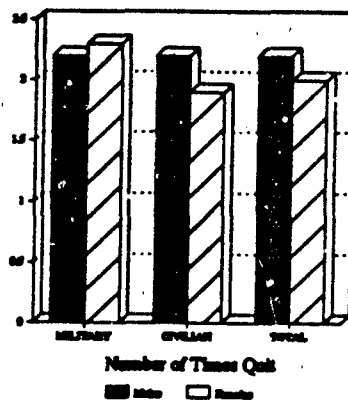
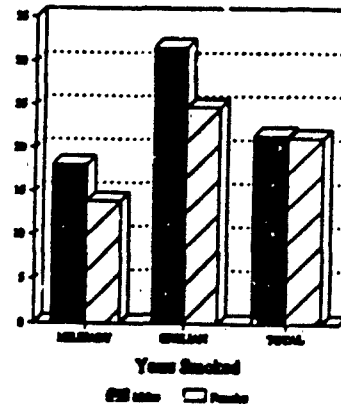
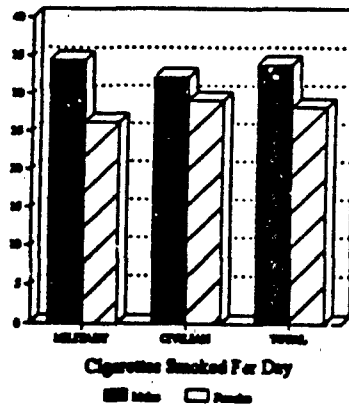
Variables	MILITARY				CIVILIAN				TOTAL			
	Males		Females		Males		Females		Males		Females	
	N	%	N	%	N	%	N	%	N	%	N	%
<b>Age:</b>	(n=307)		(n=54)		(n=87)		(n=119)		(n=394)		(n=173)	
-19	2	.7	1	1.9	1	1.0	1	.8	3	.8	2	1.2
20-29	89	29.0	31	57.4	3	2.9	18	15.1	92	23.4	49	28.3
30-39	154	50.2	18	33.3	16	15.5	29	24.4	170	43.2	47	27.2
40-49	55	17.9	4	7.4	36	35.0	36	30.3	91	23.1	40	23.1
50-59	5	1.6	-	-	5	1.6	17	14.3	10	2.5	17	9.8
60-69	2	.7	-	-	22	21.4	12	10.1	24	6.1	12	6.9
70+	-	-	-	-	4	3.9	6	5.0	4	1.0	6	3.5
Mean	33.9		28.7		49.3		42.7		41.6		35.7	
SD	7.3		6.0		12.3		12.9		9.8		9.5	
<b>Education:</b>	(n=305)		(n=56)		(n=102)		(n=119)		(n=407)		(n=175)	
0-9 Years	4	1.3	-	-	2	2.0	5	4.2	6	1.5	5	2.9
10-12 Years	164	53.8	28	50.0	40	39.2	57	47.9	204	50.1	85	48.6
Some College	120	39.3	24	42.9	48	47.1	55	46.2	168	41.3	79	45.1
Coll. Grad.	17	5.6	4	7.1	12	11.8	2	1.7	29	7.1	6	3.4
Mean	13.0		13.3		13.7		12.9		13.4		13.1	
SD	1.8		1.6		2.1		2.0		2.0		1.8	
<b>Paygrade:</b>	(n=283)		(n=48)						(n=283)		(n=48)	
E-1 to E-3	5	1.8	3	6.3	-	-	-	-	5	1.8	3	6.3
E-4 to E-6	131	46.3	34	70.8	-	-	-	-	131	46.3	34	70.8
E-7 to E-9	113	39.9	6	12.5	-	-	-	-	113	39.9	6	12.5
WO1-4/O1-3	17	6.0	3	6.3	-	-	-	-	17	6.0	3	6.3
O-4 to O-9	17	6.0	2	4.2	-	-	-	-	17	6.0	2	4.2
Mean	7.6		6.2						7.6		6.2	
SD	3.6		3.8						3.6		3.8	
<b>Occupations</b>	(n=288)		(n=50)		(n=84)		(n=105)		(n=372)		(n=155)	
1) Retired	-	-	-	-	33	39.3	53	50.5	33	8.9	53	34.2
2) Skilled	5	1.7	5	10.0	13	15.5	3	2.9	18	4.8	8	5.2
3) Clerical	139	47.9	33	66.0	16	19.1	25	23.8	155	41.7	58	37.4
4) Admin.	111	38.3	6	12.0	8	9.6	7	6.7	119	32.0	13	8.4
5) Profess.	33	11.4	6	12.0	20	23.9	22	23.1	53	14.3	28	18.1
Median	3.6		3.3		2.5		2.4		3.1		2.9	

<sup>a</sup> See footnote 5 for description of occupational categories.

six percent of the civilians quit by the end of the initial program while 18% successfully abstained at 1 year following treatment. Civilians had a 9.3% higher quit rate by the last session than military smokers and approximately 10% greater abstinence rates than military personnel in each follow-up period. By the end of the program, male and female smokers had approximately the same



Figure 1  
Smoking Habits  
by Military Status and Sex



quit rates (males=50%, females=49.4%). Fourteen percent of females successfully abstained at 1 year versus 12% of males. Using nicotine gum resulted in significant quit rates in the initial intervention (88%), the highest abstinence rates at 3 months and 6 months (50% and 30% respectively), and the second highest abstinence rates at 1 year (23%). Finally, the highest cessation rates at 1 year follow-up were shown for pre-treatment smokers smoking less than 20 cigarettes daily (24.3%). Although approximately 50% of heavy smokers quit by the last session, this group had among the lowest cessation rates 1 year later (10.9%).

#### Health Factors Related to Smoking Cessation

Analysis of variance was used to assess whether pre-existing medical or health conditions influenced cessation outcomes. Since health effects are more likely to occur among heavy smokers or long-term smokers, the variables of years smoked, quantity smoked, and daily nicotine intake from cigarettes were included in the analysis. Additionally, males and females could differ in their responses to pre-existing health conditions; therefore, gender was also included.

Length of time smoked was recoded as an ordinal variable (1= under 19 years, 2= 20 to 39 years, and 3= 40 or more years). Daily cigarette consumption was a dichotomous variable (1= 1 pack or less or light smoker, and 2= more than 1 pack or heavy smoker). Total daily nicotine intake from prior cigarette use was treated as an ordinal variable (1= less than 19 mgs., 2= 20-39 mgs., and 3=40 or more mgs.). Medical condition was a dichotomous variable indicating if a diagnosis had been made for any of the following conditions: coronary heart disease, lung cancer, hypertension, or chronic obstructive pulmonary disease (emphysema, asthma, bronchitis, and/or irreparable lung damage). Age was treated as a covariate.

Analysis of variance indicated that diagnosed medical or health condition(s) had no significant bearing on either the participants' decision to quit smoking by the end of the program or in their abstinence in the 3 month, 6 month, and 1 year follow-ups. Although medical condition may have been an important consideration in influencing some smokers to quit and/or to abstain from smoking, on the whole, those with some diagnosed medical condition were no more resolute in their efforts to quit or abstain than those who had no such medical problems.

### Factors Influencing Smoking Cessation

Analysis of variance was used to test the relationships between independent variables and quit status at the end of the program and in each of the follow-up time periods. Because success or failure in trying to quit smoking may be related to the participant's strength of addiction to nicotine, we hypothesized that the greater the nicotine intake, the more difficult it would be for smokers to stop smoking. Thus, we expected that the use of nicotine gum would be more important to quitting among those having higher nicotine levels. In addition, we were interested in the effect of program attendance on cessation outcomes and whether the combined effect of higher attendance and the use of nicotine gum would result in better smoking cessation outcomes.

Sex and military status were treated as dichotomous categorical variables (male/female and Navy/civilian, respectively). Years of education was recoded as a dichotomous variable (1 = high school or less, 2 = at least some college). Daily cigarette consumption was defined as in the previous analysis (light smokers or heavy smoker). Program attendance was split into two categories of low (1 to 3 classes attended) and high (4 to 7 classes attended). The use of nicotine gum was dummy coded with yes as 1 and no as 0. Quit status at the end of the program and in the follow-ups (3 months, 6 months, and 1 year) were each coded 0/1 with 1 indicating not smoking and 0 indicating still smoking or a failure to quit. Due to the differences in mean age between civilian and military smokers, age was controlled as a covariate.

**Quitting by the End of the Program.** The analysis revealed that quitting by the end of the program was directly influenced by program attendance ( $p < .001$ ) and using nicotine gum ( $p < .001$ ) (see Table 2 and Figure 2). Those who attended 4 or more classes were more likely to quit by the end of the program than those who attended fewer than 4 classes. In addition, quit rates were substantially greater for those who selected nicotine gum. Either the use of nicotine gum or increased attendance lead to higher quit rates.

In terms of the interaction of program attendance and nicotine gum, those who used nicotine gum and had high attendance also had higher cessation rates (see Figure 3). Although the combination of these two variables was stronger than the separate effects of attendance or use of gum alone, the combination did not produce a simply additive effect (the interaction was significant at  $p < .001$ ). Among those who had poor attendance but used nicotine gum, the quit

rate at the end of the program was higher than expected. This finding suggests the importance of using gum among low attending participants. Of particular note, the quit rate was lower than expected for those having high attendance and who used gum.

Education, by itself had no significant effect on the quit rate at the end of the program. Education showed significant interactions however, in conjunction with program attendance ( $p < .001$ ) and using nicotine gum ( $p = .001$ ). Low attendance coupled with low education (high school or less) yielded quit rates at or below that expected by either attendance or education alone (and well below the expected additive effects). High attendance produced high quit rates across both education levels, but the highest for those with a high school education. Quit rates increased with higher education among those who used nicotine gum. For those who elected not to use gum, quit rates decreased with higher education. Using nicotine gum became more important for smoking cessation the more educated a smoker was. Interestingly, those who did best without using nicotine gum were those with the least education. Quitters among this group may be motivated to stop smoking for reasons other than knowledge of the consequences of smoking.

Overall there was no significant difference in quit rates by sex; however, quit rates did vary by sex depending on whether the participants were in the military or civilian ( $p < .01$ ). Females in the Navy had quit rates lower than expected, while civilian females had rates higher than expected from the additive effects of gender and military status. Civilian females were the most successful quitters in the 7 session program.

**Abstinence in Follow-Up.** Abstinence from smoking, like quitting by the end of the program, was related to program attendance and use of nicotine gum (see Table 2 and Figure 2). Abstinence rates at 3 months were significantly higher for those with greater program attendance ( $p < .001$ ) and those who used nicotine gum ( $p = .01$ ).

Two-way interactions showed important trends in abstinence due to program attendance, use of nicotine gum, education, and sex (see Figure 3). While those with higher education had slightly better cessation rates than those with less education, the difference was not significant. Among females however, higher education contributed significantly to greater abstinence rates ( $p < .01$ ). College educated participants benefited significantly more than others from the

use of nicotine gum ( $p < .05$ ), a finding that was demonstrated in the initial program results. High program attendance made an appreciable difference in abstinence rates for those who did not use nicotine gum ( $p < .05$ ), while it made little difference in abstinence among those who did (only 2% of the participants used nicotine gum and had low attendance).

By 6 months and 1 year follow-up, the long term effects of treatment provided compelling evidence of the significant influence of program attendance and the diminishing role of nicotine gum on smoking cessation outcomes. For all participants, abstinence rates were higher among those who had high program attendance ( $p < .001$  at 6 months and  $p = .001$  at 1 year).

Education played an important role in terms of both sex and the decision to use nicotine gum. Higher educational level was associated with greater abstinence rates among females, but not among males ( $p < .05$  at 6 months and 1 year). In addition, college educated participants who elected to use nicotine gum had higher abstinence rates than the non-college educated ( $p < .05$  at 6 months and  $p < .01$  at 1 year). More educated smokers electing to use nicotine gum and attend four or more smoking classes were better abstainers than less educated smokers.

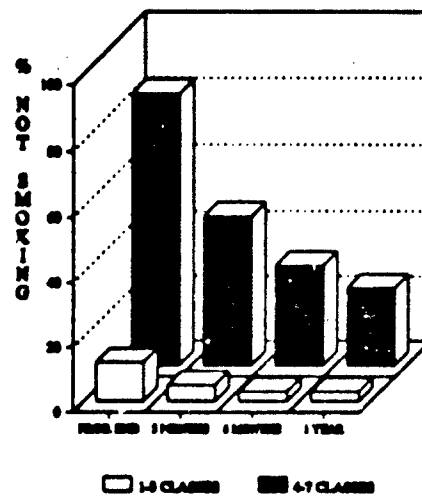
Quitting smoking by the end of the program was seen to be related to program attendance and the use of nicotine gum (see Table 2; Figures 2 and 3); however, the use of nicotine gum was heavily influenced by program attendance such that those who elected to use it were disproportionately drawn from the ranks of those with high attendance. Thus, the use of nicotine gum may be indicative of a participant's motivation to quit and may be of benefit in abstaining for all program participants for only a limited period of time. At 3 months, use of nicotine gum was related to increased abstinence rates for all participants. After 6 months, the use of gum contributed to abstinence for only college educated participants. For all participants, long term abstinence rates were most strongly related to program attendance. This finding has important implications for the Navy's smoking cessation clinics and the need to provide incentives for program completion.

**Table 2. ANOVA Results of Factors Influencing Smoking Cessation**

Main Effects	SS	MS	DF	F	Sig. of F
<b>A. Quitting in the 7 Session Program</b>					
Program Attendance	15.3	15.3	1	114.9	.000
Nicotine Gum	3.6	3.6	1	26.9	.000
<b>2-Way Interactions:</b>					
Program Attendance X Nicotine Gum	1.9	1.9	1	14.4	.000
Education X Program Attendance	2.2	2.2	1	16.3	.000
Education X Nicotine Gum	1.5	1.5	1	11.6	.001
Sex X Military/Civilian Status	1.0	1.0	1	7.7	.006
<b>B. Abstinence at 3 Months Follow-Up</b>					
Program Attendance	4.6	4.6	1	23.1	.000
Nicotine Gum	1.2	1.2	1	5.9	.016
<b>2-Way Interactions:</b>					
Education X Sex	1.4	1.4	1	7.1	.006
Education X Nicotine Gum	1.0	1.0	1	4.9	.027
Program Attendance X Nicotine Gum	.9	.9	1	4.4	.037
<b>C. Abstinence at 6 Months Follow-Up</b>					
Program Attendance	2.5	2.5	1	15.1	.000
<b>2-Way Interactions:</b>					
Education X Sex	.7	.7	1	4.3	.039
Education X Nicotine Gum	.9	.9	1	5.8	.017
<b>D. Abstinence at 1 Year Follow-Up</b>					
Program Attendance	1.6	1.6	1	11.3	.001
<b>2-Way Interactions:</b>					
Education X Sex	.6	.6	1	4.3	.040
Education X Nicotine Gum	1.1	1.1	1	7.9	.005

**FIGURE 2**  
**ANOVA MAIN EFFECTS**

**QUIT STATUS by PROG. ATTENDANCE**



**QUIT STATUS by NICOTINE GUM**

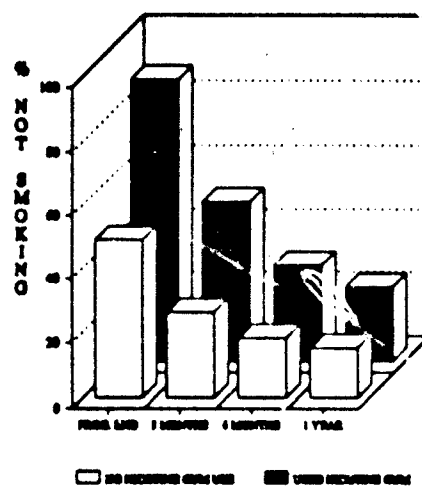
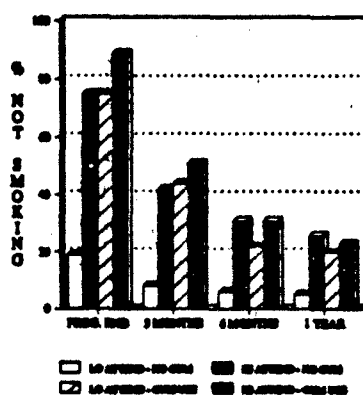
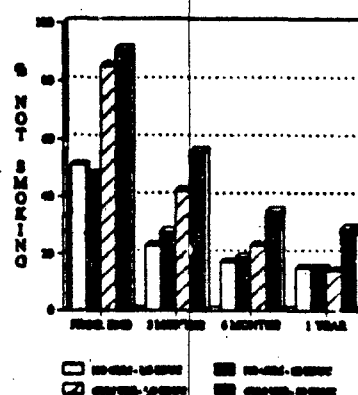


FIGURE 3  
ANOVA INTERACTION EFFECTS

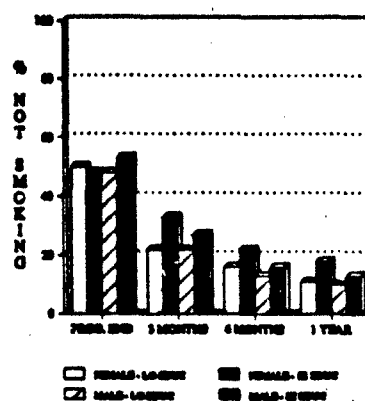
QUIT STATUS by PROG. ATTENDANCE  
by NICOTINE GUM



QUIT STATUS by EDUCATION  
by NICOTINE GUM



QUIT STATUS by SEX  
by EDUCATION





## CONCLUSION

Two of the 3 hypotheses regarding smoking cessation in the present study were supported. Receiving partial support, hypothesis 1 explored differences in military/civilian status and smoking cessation in the 7 session program and in follow-up. In the 7 session program, females in the Navy quit smoking less often than males in the military or civilians (both males and females). Although there were differences in quit rates by military/civilian status, quitting was due to factors other than simply military/civilian occupation (e.g. education, sex, program attendance). There were no military/civilian differences in abstinence.

Hypothesis 2 explored the use of nicotine gum in smoking cessation and received strong support. Using nicotine gum and program attendance were important determinants for effective quitting in the 7 session program and continued to show significant effects up to three months following treatment. Program attendance became a more important factor than nicotine gum for long term smoking cessation at 6 months and 1 year follow-ups. Additionally, the abstinence rates for those who used nicotine gum were higher than for those who did not, regardless of level of nicotine intake. Although not a direct effect, education interacted with program attendance and use of nicotine gum. In general, greater education, per se, did not lead to increased quit or abstinence rates. However, among those with high attendance, more educated participants were the most likely to quit and to abstain.

Hypothesis 3 examined the relationship between medical condition, quitting and abstinence. Results failed to show any health condition or medical diagnosis related to quitting or long term abstinence. For some individuals, medical diagnosis may have been an important reason for quitting or abstaining. For others, it did not provide strong enough motivation for quitting. Overall, health considerations were not the deciding factor to stop smoking for the majority of individuals.

The abstinence rates for those using nicotine gum were 50% at 3 months, 30% at 6 months, and 23% at 1 year. These rates were less than those reported by other studies which used a combined behavioral/pharmacological treatment design. These studies reported three month abstinence rates of 73% (Hall et al., 1985) and 60% (Tonnensen et al., 1988), six month abstinence rates of 63% (Fagerstrom, 1982), 59% (Hall et al., 1985) and 46% (Daughton et al., 1986),

and one year abstinence rates of 41% (Daughton et al., 1986) and 44% (Hall et al., 1985). The present study showed abstinence rates for 3 months and 1 year that exceeded the rates reported by 1 program that used nicotine gum with a minimum of psychological counseling. The latter program reported 3 month and 1 year abstinence rates of 36% and 22% (Kornitzer, Kittel, Dramaix et al., 1987).

Important conclusions can be drawn from the present study. First, using a combined treatment strategy of psychological and behavioral counseling along with nicotine gum enhanced the opportunities for abstinence in this sample. The reduced effects of nicotine gum over time suggest the importance of behavioral intervention for long term abstinence (longer than 3 months). Although the abstinence rates were less than those established by other studies, the differences may be attributable to the Navy environment which has a much higher rate of smoking than the general population. Worksite differences (military/civilian) between participants showed no significant main effects for smoking cessation. This does not diminish the importance of work-site factors that could predispose individuals to smoke as well as to quit.

Specific recommendations can be made to improve the Navy's overall efforts to reduce the prevalence of smoking. Removing the price subsidies of cigarettes for Navy personnel would put an additional cost penalty on smokers and could provide more of an economic incentive to stop. For those entering smoking cessation programs, smokers should be encouraged to select nicotine gum and attend as many sessions as possible. There is no systematic way to compel smokers to select these options in the absence of work-related incentives. Since most are healthy and relatively young, the health consequences of smoking provide a less tangible reason for quitting. There are increasing social penalties for smoking, both in the Navy and in the private sector. Combining these penalties with meaningful incentives could compel smokers to quit; however, the number of prospective quitters cannot be estimated. Four milligram nicotine gum should be available to those classified as heavy smokers (more than 20 cigarettes daily). Studies examining the differences between 2 and 4 milligram nicotine gums have reported increased abstinence rates among heavy smokers using higher dosage gum (Kornitzer et al., 1987; Tonnesen et al., 1988). Additionally, more rigorous behavior modification techniques should be adapted in the clinics to counter environmental stimuli to smoke while at the same time shape new non-smoking behaviors in an educational framework. A follow-up treatment program should be implemented that allows smokers to make

regularly scheduled visits to the clinic for reinforcing new behaviors and addressing problems with relapse. Implementing these changes should enhance the Navy's intervention efforts while at the same time reduce the prevalence of smoking in the Navy.

### Footnotes

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2. The Navy's smoking cessation program is an out-patient service available through the Education and Training Department, Navy Medical Clinic, San Diego Naval Station, P.O. Box 153, San Diego, Calif. 92136-5153.

3. Military transfers resulted in certain smokers having incomplete data in follow-up. Due to the random nature of military relocations, it was not likely that these people were significantly different from the remainder of the sample.

4. The guidelines used by the Navy's smoking cessation program follow recommendations put forward by the American Lung Association, American Cancer Society, the American Heart Association, and the National Cancer Institute.

5. The measure is based on the Hollingshead Two Factor Index of Social Position used to rank civilian and military occupations (Miller, 1983). Military ranks were determined by paygrade level. The scale was collapsed into five general categories. Occupation categories show equivalence between civilian/military occupations: (A) Major professionals, business managers, and lesser professionals - Commissioned officers in the military with Navy paygrades of O-4 to O-11, O-1 to O-3, and WO-1 to WO-4 (B) Administrative personnel, small business owners, and semiprofessionals - Navy chief petty officers with paygrades of E-7 to E-9 (C) Clerical and sales workers, technicians, small business owners - Petty officers with paygrades of E-4 to E-6 (D) Skilled manual employees, machine operators, and semiskilled employees

- Enlisted personnel with paygrades of E-1 to E-3 (E) Retired and not employed are not occupations but show work status.

6. Chronic obstructive pulmonary disease includes chronic bronchitis, asthma, and emphysema.

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**APPENDIX**



Table A-1. Cigarette Selection by Occupation and Sex<sup>a</sup>

Variables	MILITARY				CIVILIAN				TOTAL			
	Males		Females		Males		Females		Males		Females	
	N	X	N	X	N	X	N	X	N	X	N	X
Marlboro	78	35.8	2	6.3	14	21.2	7	10.3	92	35.3	9	10.4
Marlboro Lts.	34	15.6	9	28.1	1	1.5	6	8.8	35	13.4	15	17.2
Navy Brand <sup>b</sup>	21	9.6	1	3.1	8	12.1	6	8.8	29	11.1	7	8.1
Winston	20	9.2	-	-	8	12.1	3	4.4	28	10.7	3	3.5
Ben & Hedg Lt	10	4.6	4	12.5	5	7.6	11	16.2	15	5.8	15	17.2
Winston Lts	15	6.9	2	6.3	4	6.1	5	7.4	19	7.3	7	8.1
Kools	11	5.0	1	3.1	6	9.1	4	5.9	17	6.5	5	5.8
Salem	8	3.7	2	6.3	5	7.6	5	7.4	13	5.0	7	8.1
Ben & Hedg	8	3.7	2	6.3	4	6.1	4	5.9	12	4.6	6	6.9
Virginia Sl L	-	-	6	18.8	1	1.5	7	10.3	1	.4	13	14.9
Light	78	26.2	24	44.4	21	21.2	43	38.4	99	24.9	67	40.4
Regular	220	73.8	30	55.6	78	78.8	69	61.6	298	75.1	99	59.6
Menthol	48	16.2	26	25.7	26	25.7	31	27.9	74	18.6	57	26.9
Non-Menthol	248	83.8	75	74.3	75	74.3	80	72.1	323	81.4	155	73.1

<sup>a</sup> Top 10 brands of cigarettes selected.

<sup>b</sup> Generic brand of cigarettes available through the Navy.

**Table A-2. Percentage Rates for Quit and Abstinence  
(N for Total Subsample)**

	QUIT STATUS In Program	ABSTINENCE IN FOLLOW-UP		
		3 Month	6 Month	1 Year
Navy	46.2 (N=353)	22.2 (N=315)	12.9 (N=295)	10.1 (N=298)
Civilian	55.5 (N=211)	31.7 (N=199)	21.1 (N=175)	17.6 (N=170)
Males	50.0 (N=416)	25.1 (N=371)	14.6 (N=342)	11.9 (N=345)
Females	49.4 (N=178)	27.4 (N=168)	18.4 (N=152)	14.3 (N=147)
Used Nicotine Gum	88.3 (N=197)	50.3 (N=161)	30.1 (N=136)	23.1 (N=134)
No Nicotine Gum	49.4 (N=243)	25.6 (N=223)	18.1 (N=204)	15.2 (N=204)
Light Smokers	56.5 (N=46)	37.2 (N=43)	30.8 (N=39)	24.3 (N=37)
Heavy Smokers	48.5 (N=538)	23.8 (N=487)	13.8 (N=448)	10.9 (N=448)
TOTAL SAMPLE	49.8 (N=594)	25.8 (N=539)	15.8 (N=494)	12.6 (N=492)

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